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JOHNSON, T	2614	11

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DATE MAILED: 08/27/96

This is a communication from the examiner in charge of your application.
COMMISSIONER OF PATENTS AND TRADEMARKS

☑ This application has been examined ☐ Responsive to communication filed on _____ ☐ This action is made final.

A shortened statutory period for response to this action is set to expire 3 month(s), 0 days from the date of this letter. Failure to respond within the period for response will cause the application to become abandoned. 35 U.S.C. 133

Part I THE FOLLOWING ATTACHMENT(S) ARE PART OF THIS ACTION:

1. ☑ Notice of References Cited by Examiner, PTO-892.
2. ☑ Notice of Draftsman's Patent Drawing Review, PTO-948.
3. ☑ Notice of Art Cited by Applicant, PTO-1449.
4. ☐ Notice of Informal Patent Application, PTO-152.
5. ☐ Information on How to Effect Drawing Changes, PTO-1474.
6. ☐ _____.

Part II SUMMARY OF ACTION

1. ☑ Claims 1-21 are pending in the application.

   Of the above, claims _____ are withdrawn from consideration.

2. ☐ Claims _____ have been cancelled.
3. ☐ Claims _____ are allowed.
4. ☑ Claims 1-21 are rejected.
5. ☐ Claims _____ are objected to.
6. ☐ Claims _____ are subject to restriction or election requirement.
7. ☐ This application has been filed with informal drawings under 37 C.F.R. 1.85 which are acceptable for examination purposes.
8. ☐ Formal drawings are required in response to this Office action.
9. ☐ The corrected or substitute drawings have been received on _____. Under 37 C.F.R. 1.84 these drawings are ☐ acceptable; ☐ not acceptable (see explanation or Notice of Draftsman's Patent Drawing Review, PTO-948).
10. ☐ The proposed additional or substitute sheet(s) of drawings, filed on _____. has (have) been ☐ approved by the examiner; ☐ disapproved by the examiner (see explanation).
11. ☐ The proposed drawing correction, filed _____, has been ☐ approved; ☐ disapproved (see explanation).
12. ☐ Acknowledgement is made of the claim for priority under 35 U.S.C. 119. The certified copy has ☐ been received ☐ not been received ☐ been filed in parent application, serial no. _____; filed on _____.
13. ☐ Since this application apppears to be in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under Ex parte Quayle, 1935 C.D. 11; 453 O.G. 213.
14. ☐ Other

EXAMINER'S ACTION

Part III DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities: On page 3, line 14, "system" should be "systems"; on page 35, line 7, "means" should be "mean", on line 13, "techniques" should be "technique", and on line 18, "that" should be deleted; on page 38, line 12, "he" should be "the"; and on page 47, line 20, "processong" should be "processing". Appropriate correction is required.

2. Please provide an english version of the Komatsu et al., Reversible Subband Coding of Images, reference.

Claim Rejections - 35 USC § 112

3. Claim 17 is rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for converting coefficients into a sign/magnitude format, does not reasonably provide enablement for converting into sign-magnitude format into formatted coefficients. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the invention commensurate in scope with these claims.

The specification on page 78, lines 12-13, provides for converting coefficients into sign/magnitude format, but does not provide for a further converting into some formatted coefficients. It is not clear that the formatted coefficients are the same as the sign-magnitude format as claimed, that is, is there a further conversion to obtain some formatted coefficients, or is there just one conversion of the coefficients into sign/magnitude coefficients as disclosed in the specification?

4. Claim 18 is rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 18 lacks antecedent basis for "single bit stream" as it depends on claim 15.

5. Claim 17 is rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The wording of lines 4-5 are unclear in that it appears that by converting, there is one conversion taking place, but by using "into" twice, it appears that there are two conversion. Are there one or two conversions?

6. Claim 20 is rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 20 recites high and low order bits. First, the terms "high" and "low" are vague, in that the line of demarcation is unknown. Second, the terms "high order" and "low order" are incomplete, in that it is unclear what is being referred to as high or low, for example, is it frequency or energy, or even some other parameter?

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. § 103 which forms the basis for all obviousness rejections set forth in this Office action:

> A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.
>
> Subject matter developed by another person, which qualifies as prior art only under subsection (f) or (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

8. Claims 1, 2, 5, 7-9, and 12 are rejected under 35 U.S.C. § 103 as being unpatentable over Reusens et al.

For claim 1, Reusens provides for losslessly compressing wavelet signals in the first five lines of the abstract. Since there is quantization distortion introduced in the second paragraph in the "General description of the codec" on page 381 and 382, and where quantization is provided in Fig. 1 on page 381, where quantization is followed by coding mentioned in the third paragraph on page 382 under the same section above, which can be lossless, it is obvious that Reusens provides for a losslessly compressed version of the input.

For claims 2, a plurality of coefficients is also provided in the first five lines of the abstract.

For claim 5, an image is provided for in the title.

For claims 7 and 8, decompressing the losslessly compressed version, and generating the reconstructed version of the original using an inverse wavelet transform is provided in the last sentence of the first paragraph of section 4 on page 384 of Reusens, where wavelet coding using a codec (coder-decoder) inherently provides for a reverse wavelet transform in order to losslessly reconstruct the original image which is shown in Fig. 4 on page 385.

For claim 9, coefficients are inherently produced by an inverse wavelet transform.

For claim 12, see claims 1, and 7 and 8 above.

9. Claim 3, 4, 6, 10, and 11 are rejected under 35 U.S.C. § 103 as being unpatentable over Reusens as applied to claims 1, 2, 5, 7-9, and 12 above, and further in view of Shapiro.

For claim 3, Reusens does not specify if the filters used in the decomposition of the input data are non-minimal. Shapiro discloses a wavelet compression method that also provides for a losslessly compressed version on the input by using an arithmetic coder as noted in the last two lines of the abstract. Shapiro provides for non-minimal length filters in lines 11 and 12 of paragraph C on page 3447, since the filters are separable and not a pair of filters, and since the applicant refers to minimal length filters as a pair of filters on page 23, lines 10-11. It is also shown in Fig. 2 that the filters provide for non-minimal length filters because the filters provide for overlapping of the transform in that

the second stage shows in the upper left corner coefficients overlapped in the first stage coefficient, since minimal length filters do not implement an overlapped transform as noted by the applicant on page 23, lines 12-14. Reusens may use any one of many ways of decomposing the input data including that provided by Shapiro. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the non-minimal length filters of Shapiro, since it is conventional to provide for several subbands as shown by Shapiro in Fig. 2.

For claim 4, the filters are one dimensional, since Shapiro in paragraph C on page 3447, lines 11-12, provides for application of vertical and horizontal filters where horizontal and vertical refer to a separate single dimension.

For claim 6, bit significance embedding coding is provided by Shapiro in the first five lines of the abstract.

For claim 10, Shapiro provides for decoding on the fourth line in the second column on page 3457, where it is inherent and well known in subband coding that in order to decode, synthesis filters are used which are the inverse configuration of the decomposition filters used for coding, and since the decomposition filters are non-minimal as noted above for claim 3, so are the synthesis filters, which provide for at least one non-minimal length reversible filter.

For claim 11, as noted above for claims 4 and 10, the reversible filters are one-dimensional.

10. Claims 1, 2, 5, 7-9, and 12 are rejected under 35 U.S.C. § 103 as being unpatentable over Reusens et al. in view of Langdon, Jr.

For claim 1, Reusens provides for wavelet compression as noted above for claim 1 in paragraph 9, where he submits some quantization distortion by quantization as shown in Fig. 1 on page 381, thus not providing for purely lossless compression. Langdon discloses a lossless compression system as noted in the title. Langdon provides for encoding the quantization error in the eight lines of the fourth paragraph in the introduction on page 272, so that the compression is purely

lossless. It would have been obvious to one having ordinary skill in the art at the time the invention was made to encode the quantization error, since it is very well known that lossless compression is important in many applications as taught by Langdon in the first two lines of the introduction on page 272.

For claims 2, 5, 7-9, and 12, see above claims as treated in paragraph 9.

11. Claims 13 - 17 and 19-21 are rejected under 35 U.S.C. § 103 as being unpatentable over Shapiro in view of Hartung et al.

For claim 13, Shapiro discloses a embedded wavelet transform encoding system on page 3446, in the first four lines of section B. Shapiro also provides for ordering the coefficients and bit significance embedding of the coefficients in the third and fourth bulleted paragraphs of section B on page 3446. Shapiro does not provide for the concept of two different codings of first and second portions of the data. Hartung discloses a subband image compression system as noted in the title and as shown in Fig. 1. Hartung also provides for ordering the coefficients and bit significance embedding in col. 1, line 45 - col. 2, line 14, in that the significance of the subbands is ascertained so that ordering of the bands are coded differently, where the lowest frequency band with the most energy is PCM coded, and the upper frequency bands are encoded with a different scheme, where the coefficients are ordered by a bit allocation scheme. Shapiro can use an adaptive encoding scheme where he may use different coders based on energy or other parameters. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the adaptive encoding scheme of Hartung, since it is common to accurately encode the subband with the most energy (information).

For claim 14, Shapiro provides for wavelet filtering as noted above for claim 13.

For claim 15, Shapiro provides for tree coding in the second bulleted paragraph under section B. on page 3446. Hartung does not provide for tree coding for a first type of coding, but rather uses PCM. Using the concept of Hartung, Shapiro can use his tree coding in place of the Hartung's coding.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use tree coding for a first type of coding, since it is well known that zerotree coding allows the successful prediction of insignificant coefficients as taught by Shapiro in the second bulleted paragraph of section B on page 3446.

For claim 16, Shapiro provides for formatting the coefficients into sign-magnitude format on lines 12-18 of the second column on page 3453.

For claim 17, Shapiro provides for reversible wavelet transforming of the input as noted above for claim 13, and where the wavelet transform is reversible, since the decoding process is able to decode as noted in the first sentence in section VI on page 3457. The coefficients are converted into sign-magnitude format as noted for claim 16 above. Two different types of coding are used for a first and second bit stream as noted above for claim 13, and the bit streams are combined into a single bit stream as shown in block 430 of Fig. 2 of Hartung.

For claim 19, see claim 15 above.

For claim 20, Hartung does not state which portion comprises the high order bits and which portion comprises the lower order bits as to whether one portion is a first or second portion. It would have been obvious, since applicant has not disclosed that the first portion comprising the high order bits solves any stated problem or is for any particular purpose and it appears that the invention would perform equally well with either way.

For claim 21, Shapiro provides for a losslessly compressed version of the input, since he uses an arithmetic coder on page 3454 in the title of paragraph C which is well known to be a lossless encoder.

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Huang et al., 5,541,594, discloses a coder, and notes in col. 2, lines 45-50, that losslessly includes quantization error.

Shapiro, 5,412,741, discloses a wavelet embedded zerotree coding and decoding method in the abstract.

Torbey, 4,858,017, discloses a hierarchal subband lossless coding and decoding system as noted in the title and in the bottom of col. 5.

Zhang et al., 5,495,292, discloses adaptive bit allocation encoding of wavelets into a bit stream in the last four lines of the abstract.

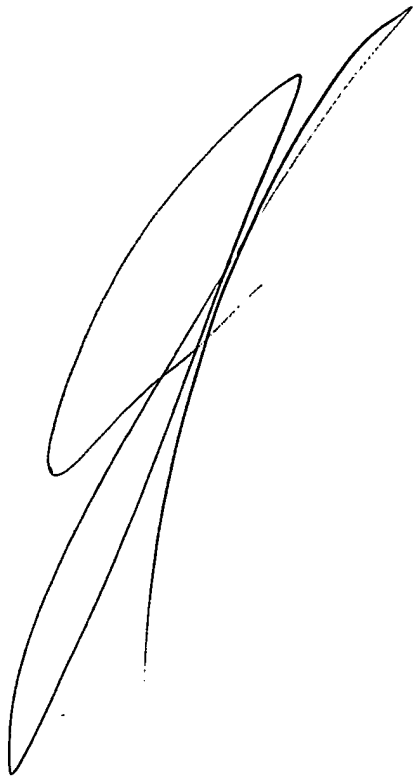
Wilkinson et al., 5,384,869, discloses different length filters of a subband system in the abstract.

Contact information

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Timothy M. Johnson whose telephone number is (703) 306-3096.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 305-8576.

The Group Art Unit 2613 FAX number is (703) 308-6606.



Timothy M. Johnson
Patent Examiner
Group Art Unit 2613
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